

Table 10: gp120

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
gp120(39-51)	gp120(31-43)	EQLWVTVYYGVPV	peptide	murine(H-2 ^{bzrk})	[Sastry & Arlinghaus(1991)]
	• Peptides induced T-cell proliferative response to immunizing peptide and to gp160				
gp120(45-55)	gp120(37-47)	VYYGVPVWKEA	peptide	murine(H-2 ^{bzrk,sxd})	[Sastry & Arlinghaus(1991)]
	• Peptides induced T-cell proliferative response to immunizing peptide and to gp160				
env(45-55)	gp120(37-47)	VYYGVPVWKEA	Peptide immunization	rhesus monkeys	[Nehete (1993)]
	• Synthetic peptide derived from conserved region of the HIV-1 envelope that stimulates a proliferative response in mice				
	• Proliferative response to this peptide was observed in 3/3 immunized rhesus monkeys				
gp120(48-61)	gp120(40-53)	GVPVWKEATTLC	peptide	murine(H-2 ^{sxd})	[Sastry & Arlinghaus(1991)]
	• Peptides induced T-cell proliferative response to immunizing peptide and to gp160				
env(48-60)	gp120(40-53)	GVPVWKEATTLC	Peptide immunization	rhesus monkeys	[Nehete (1993)]
	• Synthetic peptide derived from conserved region of the HIV-1 envelope that stimulates a proliferative response in mice				
	• Despite the proliferative response to this peptide in mice, no response was observed in 3 rhesus monkeys				
gp120(72-82)	gp120(64-74)	AHKVWATHACV	peptide	murine(H-2 ^{bzrk,sxd})	[Sastry & Arlinghaus(1991)]
	• Peptides induced T-cell proliferative response to immunizing peptide and to gp160				
gp120(74-85 LAI)	gp120(73-84)	CVPTDNPQEVV?	HIV infection	human(unk)	[Schrier (1989)]
	• Stimulates T-cell proliferation in HIV-infected donors				

II-19
DEC 97

HIV Helper T-cell Epitopes

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
gp120(81-92)	gp120(73-84) • Peptides induced T-cell proliferative response to immunizing peptide and to gp160	CVPTNPVPQEVV peptide	murine(H-2 ^{b₂k,sxd})	[Sastry & Arlinghaus(1991)]	
gp120(108-119 LAI)	gp120(107-118) • Stimulates T-cell proliferation in HIV-infected donors	IISLWDQSLKPC?	HIV infection human(unk)	[Schrier (1989)]	
gp120(101-126)	gp120(100-125) • Study showing that T cell determinants from glycoproteins can be dependent on the glycosylation of the protein	VEQMHEDIISLWDQSL- KPCVKLTPLC	glycosylated gp160	murine(H-2 ^k)	[Sjolander (1996)]
gp120(109-121)	gp120(101-113) • Peptides induced T-cell proliferative response to immunizing peptide and to gp160	EQMHEDIIISLWDQ	peptide	murine(H-2 ^{b₂k})	[Sastry & Arlinghaus(1991)]
gp120(109-123 IIIB)	gp120(101-115) • Six multideterminant helper T-cell regions are recognized by mice of three or four MHC types	EQMHEDIIISLWDQSL	III B gp160	murine(H-2 ^{d,i₅})	[Hale (1989)]
gp120(112-124 IIIB)	gp120(104-116) • Epitope T2: Six multideterminant helper T-cell regions are recognized by mice of three or four MHC types	HEDIIISLWDQSLK	III B gp160	murine(H-2 ^k)	[Hale (1989)]
gp120(112-124 BH10)	gp120(104-116) • Epitope T2: 1 of 2 functional epitopes identified using an amphipathic helix epitope prediction algorithm	HEDIIISLWDQSLK	env fragment	murine(H-2 ^{k,s})	[Cease (1987)]

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
gp120(112-124 BH10)	gp120(104-116)	HEDIISLWDQSLK	gp160 (IIIB) vaccinia	human(unk)	[Berzofsky (1988)]
	• Epitope T2:	Proliferative response to T1 and T2 peptides in 14 immunized, uninfected humans			
gp120(112-124 IIIB)	gp120(104-116)	HEDIISLWDQSLK	HIV infection	human(unk)	[Clerici (1989)]
	• Epitope T2:	IL-2 production detection of T-helper lymphocytes from asymptomatic HIV-positive individuals			
gp120(112-124 IIIB)	gp120(104-116)	HEDIISLWDQSLK	HIV infection	human(unk)	[Clerici (1991a)]
	• Epitope T2:	Peptides stimulate Th cell function and CTL activity in similar patient populations			
gp120(112-124)	gp120(104-116)	HEDIISLWDQSLK	rgp160	human(unk)	[Clerici (1991b)]
	• Epitope T2:	Immunizing uninfected individuals with rgp160 results in stronger Th response than does natural infection			
gp120(112-124 IIIB)	gp120(104-116)	HEDIISLWDQSLK	HIV exposure	human(unk)	[Clerici (1992)]
	• Epitope T2:	Cell-mediated immune response to HIV-1 peptides in HIV-1 exposed seronegative men			
gp120(112-124 IIIB)	gp120(104-116)	HEDIISLWDQSLK	peptide priming gp160 boost	rhesus monkeys(unk)	[Hosmalin (1991)]
	• Epitope T2:	Peptide priming to induce T-cell help enhances antibody response to gp160 immunization			
gp120(112-124 IIIB)	gp120(104-116)	HEDIISLWDQSLK	HIV exposure	human(unk)	[Pinto (1995)]
	• Epitope T2:	CTL activity analyzed in parallel with T helper reactivity in exposed but uninfected health care workers			

HIV Helper T-cell Epitopes

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
gp120(115-126 LAI)	gp120(114-125)	SLKPCVVKLTPLC?	HIV infection	human(unk)	[Schrier (1989)]
	• Stimulates T-cell proliferation in HIV-infected donors				
gp120(110-125)	gp120(109-124)	SLWDQSLKPCVKLTPL	HIV-1 infection	human(unk)	[Caruso (1997)]
	• T cells from HIV-1 infected individuals as they progress to disease show reduced ability to proliferate in response to HIV antigen, but retain the ability to express the activation antigens CD25 and CD71				
	• The ability to express activation markers in response to HIV is retrained, but not in response to tetanus toxoid recall antigen				
	• This study investigated CD25 and CD71 expression in PBMC from patients in various stages of progression response to <i>in vitro</i> stimulation by peptide cocktail containing four antigenic Env peptides, or else p17 and p24				
gp120(118-130)	gp120(110-122)	LWDQSLKPCVVKLT	Peptide immunization	rhesus monkeys	[Nehete (1993)]
	• Synthetic peptide derived from conserved region of the HIV-1 envelope that stimulates a proliferative response in mice				
	• Proliferative response to this peptide was observed in 3/3 immunized rhesus monkeys				
gp120(115-129 LAI)	gp120(114-128)	SLKPCVVKLTPLCVSL	none	human(HLA-DR)	[Gaudelot (1997)]
	• Peptide bound to both HLA-DR*1101 and HLA-DR*0401 with high affinity				
	• Because of the distinctive binding pockets of HLA-DR*1101 and HLA-DR*0401, peptides that bound both are considered candidates for promiscuous for HLA-DR binding				
gp120(160-174 LAI)	gp120(159-173)	KNCFSFNISTSIRGKV	none	human(HLA-DR)	[Gaudelot (1997)]
	• Peptide binds to both HLA-DR*1101 and HLA-DR*0401 with high affinity				
	• Because of the distinctive binding pockets of HLA-DR*1101 and HLA-DR*0401, peptides that bound both affinity are considered candidates for promiscuous for HLA-DR binding				
gp120 (162-181 IIIB)	gp120 (166-185)	STSIRGKVQKEYAFFY-	HIV-1 gp120 DNA	rhesus monkeys	[Lekutis (1997)]
	KLDI	vaccine			
	• HIV-1 env DNA vaccine induced Th cell response to this epitope in a rhesus monkeys				

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
gp120 (172-191 IIIB)	gp120 (176-195) TTSY	EYAFFYKLDIPIIDND-	HIV-1 gp120 DNA vaccine	rhesus monkeys	[Lekutis (1997)]
		• HIV-1 env DNA vaccine induced Th cell response to this epitope in a rhesus monkey			
gp120(193-218)	gp120(197-222) FEPPIHYC	LTS CNSVITQACPKVS- glycosylated gp160	murine(H-2 ^{d,b})	[Sjolander (1996)]	
		• Study showing that T cell determinants from glycoproteins can be dependent on the glycosylation of the protein			
gp120(204-216)	gp120(203-215) • Peptides induced T-cell proliferative response in mice representing four haplotypes	SVTTQACSKVVSFE	peptide	murine(H-2 ^{b^{x,t,sx,t}})	[Sastry & Arlinghaus(1991)]
env(204-216)	gp120(203-215) • Synthetic peptide derived from conserved region of the HIV-1 envelope that stimulates a proliferative response in mice	SVTTQACSKVVSFE	Peptide immunization	rhesus monkeys	[Nehete (1993)]
		• A weak or transient proliferative response to this peptide was observed in 3/3 immunized rhesus monkeys			
gp120(205-219 LAI)	gp120(204-218)	VITQACPKVSFEPPIP	none	human(HLA-DR)	[Gaudreault (1997)]
		• Peptide binds to both HLA-DR*1101 and HLA-DR*0401 with high affinity			
		• Because of the distinctive binding pockets of HLA-DR*1101 and HLA-DR*0401, peptides that bound both are considered candidates for promiscuous for HLA-DR binding			
gp120(206-230)	gp120(210-234)	PKVSFEPPIHYCAPA- GFAILKCNN	glycosylated gp160	murine(H-2 ^{d,b})	[Sjolander (1996)]
		• Study showing that T cell determinants from glycoproteins can be dependent on the glycosylation of the protein			

HIV Helper T-cell Epitopes

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
gp120(215-228)	gp120(214-227)	FEPPIPHYCAFPGF	peptide	murine(H-2 ^{b_{Kk}})	[Sastry & Arlinghaus(1991)]
	• Peptides induced T-cell proliferative response to immunizing peptide and to gp160				
gp120(HXB)	gp120(224-239)	PAGFAILKCNNKTFNY	Peptide priming, <i>in vitro</i> human(DR2)	human(DR2)	[Manca (1995b)]
	• Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i>				
	• Peptide priming does not always induce T-cells that recognize whole protein				
	• gp120 priming induced T-cells that recognize this peptide				
gp120(225-240 SF2)	gp120(224-238)	PAGFAILKCNNKTFN	Peptide, <i>in vitro</i>	(unk)	[Manca (1993)]
	• T-cell line derived from un-primed, uninfected individual				
	• Responds to APC pulsed with either synthetic peptide or gp120				
	• Human MAbs 448-D and 450-D enhance APC gp120 uptake and presentation				
gp120(194-202 HXB2)	gp120(227-235)	FAILKCNNK	gp120-APC protein	human(DR2,6)	[Manca (1996)]
	• This epitope was the minimal stimulatory sequence defined for two Th lines stimulated <i>in vitro</i>				
	• One Th line was stimulated by gp120, one by a Glutathione-S-transferase (GST)-peptide fusion				
	• Alanine substitutions at position 914, 196, and 202 abrogated activity for the GST-peptide stimulated line, but not for a gp120 stimulated line				
	• Constructs combining GST and the PAGFAILKCNNKTFNY gp120 peptide at the C-term end of GST stimulated Th cells but not at the N-term end				
gp120(194-202 HXB2)	gp120(227-235)	FAILKCNNK	gp120-APC protein	human(DR2,6)	[Manca (1996)]
	• This epitope was the minimal stimulatory sequence defined for two Th lines stimulated <i>in vitro</i>				
	• One Th line was stimulated by p66, one by a Glutathione-S-transferase (GST)-peptide fusion protein				
	• Alanine substitutions at position 914, 196, and 202 abrogated activity for the GST-peptide stimulated line, but not for a gp120 stimulated line				
	• Constructs linking GST to the PAGFAILKCNNKTFNY gp120 peptide at the C-term end of GST stimulated Th cells, constructs linking at the N-term end did not				
	• The C and N termini of GST are not intrinsically permissive or non-permissive, presentation is epitope specific (see SSTVNDIQQLV for contrast)				

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
gp120(IIIB)	gp120(234-249)	NKTFNGKGPCTNVSTY	Peptide priming <i>in vitro</i>	human(unk)	[Manca (1995b)]
		• Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i>			
		• Peptide priming does not always induce T-cells that recognize whole protein			
gp120(240-252)	gp120(239-251)	GTGPCTNVSTVQC	Peptide immunization	rhesus monkeys	[Nehete (1993)]
		• Synthetic peptide derived from conserved region of the HIV-1 envelope that stimulates a proliferative response in mice			
		• Proliferative response to this peptide was observed in 1/3 immunized rhesus monkeys, with a weak transient response in the other two			
gp120(IIIB)	gp120(244-258)	TNVSTVQCTHGRPIY	Peptide priming <i>in vitro</i>	human(unk)	[Manca (1995b)]
		• Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i>			
gp120(242-261 IIIB)	gp120(246-265)	VSTVQCTHGRIPVVST-QLLL	SHIV-89.6 infection	Macaca mulatta (DRB1*0406)	Lekutis & Letvin[1997]
		• C2 region epitope that has not been previously described			
gp120(IIIB)	gp120(254-269)	GIRPIVSTQLLNGSC	Peptide priming <i>in vitro</i>	human(unk)	[Manca (1995b)]
		• Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i>			
		• Peptide priming does not always induce T-cells that recognize whole protein			
gp120(269-283 IIIB B10)	gp120(273-287)	EVVIRSANFTDNAKT	HIV infection	human(unk)	[Wahren (1989b), Wahren (1989a)]
		• 12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses			

HIV Helper T-cell Epitopes

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
gp120(IIIB)	gp120(274-289)	VVIRSDNFTNNAKTIC	Peptide priming <i>in vitro</i>	human(unk)	[Manca (1995b)]
		• Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i>			
		• Peptide priming does not always induce T-cells that recognize whole protein			
gp120(274-288 IIIB B10)	gp120(278-292)	SANFTDNAKTIIVQL	HIV infection	human(unk)	[Wahren (1989b), Wahren (1989a)]
		• 12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses			
gp120(IIIB)	gp120(284-299)	NAKTIIVQLNESVAIC	Peptide priming <i>in vitro</i>	human(unk)	[Manca (1995b)]
		• Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i>			
		• Peptide priming does not always induce T-cells that recognize whole protein			
gp120(296-312 LAI)	gp120(295-311)	SVVEINC TRPNNNTRK- S?	HIV infection	human(unk)	[Schrier (1989)]
		• Stimulates T-cell proliferation in HIV-infected donors			
gp120(292-300 SF2)	gp120(293-301)	NESVAINCT	env 2-3, SF2 gp120	human(unk)	[Botarelli (1991)]
		• A non-glycosylated form of gp120 was used as an immunogen; 20% of T-cell clones do not recognize the glycosylated form			
gp120(MN)	gp120(294-299)	ESVQIN	immunization	murine(unk)	[Veronese (1994)]
		• In a filamentous bacteriophage coat protein background, simulated Ab production to the V3 loop tip			
gp120(303-321 IIIB)	gp120(300-316)	C ³ TRPNNNTRKSIRIQR- GPG(Y)	polyvalent peptide	goat(unk)	[Falker (1989)]
		• Goats were immunized with peptides containing V3 type-specific neutralizing determinants coupled to T1			

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
gp120(307-322 IIIB)	gp120(306-317)	NTRKSIRIQRGPGR	peptide	murine(unk)	Goodman-Snitkoff (1990)
		(CG)KSIRIQRGPGR-AFVTIG	HIV-1 infection	human(unk)	[Adams (1997)]
gp120(312-329)	gp120(308-325)				
		• Used as positive control in study examining T-cell response to four p24 Gag peptides			
gp120(306-325 MN) (DRB1*0101)	gp120(310-329) [Hayball (1997)]	RJHIGPTKNIIGIT	HIV-1 infection	human	
		• Tandem repeated presentation of epitope enhances binding to class II molecule and therefore induction of T cell proliferation			
		• Tandem peptides are thought to enhance proliferation through improved recruiting of CD4 to the activation complex, which can counter-balance gp120's sequestering of CD4 and consequential inhibition of a proliferative response			
gp120(309-323 IIIB B10)	gp120(311-325)	EQRGPGRAFVTIGK	HIV infection	human(unk)	[Wahren (1989b), Wahren (1989a)]
		• 12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses			
gp120(315-329 IIIB)	gp120(310-324)	RIQRGPGRAFVTIGK	vaccinia IIIB gp160	murine(H-2 A ^d)	[Takahashi (1990)]
		• Epitope P18: Induces both class II restricted CD4+ Th cells, and class I restricted CD8+ CTL			
gp120(315-329 IIIB)	gp120(310-324)	RJQRGPGRAFVTIGK	Peptide immunization	rhesus monkeys	[Nehete (1993)]
		• Synthetic peptide derived from conserved region of the HIV-1 envelope that stimulates a proliferative response in mice			
		• Despite the proliferative response to this peptide in mice and humans, no response was observed in 3 rhesus monkeys			

HIV Helper T-cell Epitopes

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
gp120(315-329 IIIB)	gp120(310-324)	RIQRGPGRAFVTIGK	HIV-1 infection	human(unk)	[Wasik (1997)]
		• The breadth and intensity of the CTL response and the type of Th response was studied in seven rapidly progressing HIV-1+ infants			
		• IL-2 and γ IFN production from Th 1 cells correlated with the CTLp frequency against HIV-1 Gag, Env, Nef and Pol			
		• IL-4 production from Th 2 cells was inversely correlated with the CTLp frequency			
		• The HIV-1+ children with a strong CTL responses had levels anti-CD3 MAb induction of Th 1 cells at comparable levels to uninfected children			
		• The children that did not mount a good CTL response had dramatically decreased numbers of Th1 relative to Th2 cells			
gp120(315-329 IIIB)	gp120(310-324)	RIQRGPGRAFVTIGK		murine(H-2 I-A ^d)	[Takeshita (1995)]
		• Epitope P18: Binds Class II H-2 I-A ^d requiring riqrGPgRaFvti, and Class I H-2 D ^d , requiring iGPgRaFvti			
gp120(315-329 IIIB)	gp120(310-324)	RIQRGPGRAFVTIGK	HIV infection	human(DR)	[Baier (1995)]
		• Epitope P18: Linked HIV-1 T1 and P18 peptides to anti-HLA-DR and Ig D Fab fragments to enhance uptake by antigen presenting cells thus increase immunogenicity			
gp120(315-329 IIIB)	gp120(310-324)	RIQRGPGRAFVTIGK	HIV exposure	human(unk)	[Pinto (1995)]
		• Epitope P18: CTL activity analyzed in parallel with T helper reactivity in exposed but uninfected health care workers			
gp120(315-329 MN)	gp120(310-324)	RIHIGPGRAFYTTKN	HIV exposure	human(unk)	[Pinto (1995)]
		• Epitope P18: CTL activity analyzed in parallel with T helper reactivity in exposed but uninfected health care workers			
gp120(315-329 IIIB)	gp120(310-324)	RIQRGPGRAFVTIGK	HIV infection	human(unk)	[Clerici (1989)]
		• Epitope P18: IL-2 production detection of T-helper lymphocytes from asymptomatic HIV-positive individuals			

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
gp120(315-329 IIIB)	gp120(310-324) • Epitope P18:	RIQRGPGRAFVTIGK	HIV infection	human(unk)	[Clerici (1991a)]
gp120(315-329 IIIB)	gp120(310-324) • Epitope P18:	RIQRGPGRAFVTIGK	rgp160	human(unk)	[Clerici (1991b)]
gp120(315-329 IIIB)	gp120(310-324) • Epitope P18:	RIQRGPGRAFVTIGK	HIV exposure Cell-mediated immune response to HIV-1 peptides in HIV-1 exposed seronegative men	human(unk)	[Clerici (1992)]
gp120(MN)	gp120(310-324) • Epitope P18 MN:	RIHICPGRAFYTTKRN	HIV exposure Cell-mediated immune response to HIV-1 peptides in HIV-1 exposed seronegative men	human(unk)	[Clerici (1992)]
gp120(MN)	gp120(310-323) • Epitope SP10: • 10-mer from V3	RIHICPGRAFYTTK peptide	IL-4 and IL-6 in a dose dependent manner	murine(H-2 ^d)	[Klimman (1995)]
gp120(314-330)	gp120(311-327)	IQRGGPGRAFVTIGKIG- N	HIV-1 infection	human(unk)	[Caruso (1997)]
			<ul style="list-style-type: none"> • T cells from HIV-1 infected individuals as they progress to disease show reduced ability to proliferate in response to HIV antigen, but retain the ability to express the activation antigens CD25 and CD71 • The ability to express activation markers in response to HIV is retrained, but not in response to tetanus toxoid recall antigen • This study investigated CD25 and CD71 expression in PBMC from patients in various stages of progression response to <i>in vitro</i> stimulation by peptide cocktail containing four antigenic Env, peptides, or else p17 and p24 		

HIV Helper T-cell Epitopes

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
gp120(314-328 IIIB B10)	gp120(316-330)	GRAFVTIGKIGNMRQ	HIV infection	human(unk)	[Wahren (1989b), Wahren (1989a)]
			• 12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses		
gp120(324-338 IIIB)	gp120(319-333)	FVTIGKIGNMRQAH	IIIB gp160	murine(H-2 ^{k,d})	[Hale (1989)]
		• Six multideterminant helper T-cell regions are recognized by mice of three or four MHC types			
gp120(IIIB)	gp120(324-339)	RIIGDIRKAHCNISRY	Peptide priming <i>in vitro</i>	human(unk)	[Manca (1995b)]
		• Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i>			
		• Peptide priming does not always induce T-cells that recognize whole protein			
gp120(327-341 HXB2)	gp120(330-344)	RQAHCNISRAKWNNT	rec HXB2 gp120	murine(I-A ^d)	[Warren & Thomas (1992)]
		• Murine T-cell clone; MHC restriction determined, minimum epitope defined, N terminal flank of the V3 loop.			
gp120(IIIB)	gp120(334-348)	CNISRAQWNNTLEQI	Peptide priming <i>in vitro</i>	human(unk)	[Manca (1995b)]
		• Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i>			
		• Peptide priming does not always induce T-cells that recognize whole protein			
gp120(342-356 IIIB)	gp120(338-352)	RAKWNNNTLJKQICSKL	IIIB gp160	murine(H-2 ^{k,H4,i5})	[Hale (1989)]
		• Six multideterminant helper T-cell regions are recognized by mice of three or four MHC types			
gp120(IIIB)	gp120(344-361)	TLEQIVVKLREQFGNC	Peptide priming <i>in vitro</i>	human(unk)	[Manca (1995b)]
		• Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i>			
		• Peptide priming does not always induce T-cells that recognize whole protein			

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
gp120(346-359)	gp120(347-360)	QIVKKKLREQFGNNK	HIV infection	human(unk)	[Krowka (1990)]
		• Conjugation of HIV peptides to liposomes and rIL-2 stimulation may enhance cell-mediated responses			
gp120(PIIB)	gp120(344-361)	TLEQIVKKLREQFGNC	Peptide priming <i>in vitro</i>	human(unk)	[Manca (1995b)]
		• Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i>			
		• Peptide priming does not always induce T-cells that recognize whole protein			
gp120(355-362 PIIB)	gp120(358-365)	FGNNKTII	SHIV-HXBc2 infection	Macaca mulatta (unk)	[Lekutis & Letvin(1997)]
gp120(364-378 PIIB B10)	gp120(368-382)	SGGGKPEIVTHSFNC	HIV infection	human(unk)	[Wahren (1989b), Wahren (1989a)]
		• 12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses			
gp120(368-377 LAI)	gp120(367-376)	QSSGGDPFIV?	HIV infection	human(unk)	[Schrier (1989)]
		• Stimulates T-cell proliferation HIV-infected donors			
gp120(369-383 PIIB B10)	gp120(373-387)	PEIVTHSFNCGGEFF	HIV infection	human(unk)	[Wahren (1989b), Wahren (1989a)]
		• 12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses			
gp120(PIIB)	gp120(385-399)	EFFYCNTTQLFNNTW	Peptide priming <i>in vitro</i>	human(unk)	[Manca (1995b)]
		• Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i>			
		• Peptide priming does not always induce T-cells that recognize whole protein			

HIV Helper T-cell Epitopes

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
gp120(IIIB)	gp120(395-410)	FNNTWRLNHTEGTKGC	Peptide priming <i>in vitro</i> • Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i> • Peptide priming does not always induce T-cells that recognize whole protein	human(unk)	[Manca (1995b)]
gp120(394-408 IIIB B10)	gp120(398-412)	TWFNSTWSTKGSSNN	HIV infection	human(unk)	[Wahren (1989b), Wahren (1989a)]
gp120(399-413 IIIB B10)	gp120(398-412)	TWSTKGNNTEGSDDT	HIV infection	human(unk)	[Wahren (1989b), Wahren (1989a)]
gp120(410-429 PV22)	gp120(410-430)	GSDTTITLPCRRIKQFIN-MWQE	HIV infection	human(DR4)	[Callahan (1990)]
		• Synthetic peptides representing natural variants were used to test for recognition in the context DR4			
gp120(410-429 PV22)	gp120(410-430)	GSDTTITLPCRRIKQFIN-MWQE	HIV infection	human(DR4(Dw10))	[Polydefkis (1990)]
		• Human CD4+ T-cell clones lyse recombinant vaccinia virus-infected cells that synthesize envelope gp160			
gp120(IIIB)	gp120(417-432)	LPCRIKQIINMWQEYV	Peptide priming <i>in vitro</i> • Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i> • Peptide priming does not always induce T-cells that recognize whole protein	human(unk)	[Manca (1995b)]

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
gp120(424-438 IIIB B10)	gp120(425-439)	NNMWQEVGKAMYAPP	HIV infection	human(unk)	[Wahren (1989b), Wahren (1989a)]
			• 12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses		
gp120(428-443 IIIB B10)	gp120(422-437)	KQIINNMWQEVGKAMYA	env fragment	murine(H-2 ^{k,d,s})	[Cease (1987)]
		• Epitope T1: 1 of 2 functional epitopes identified using an amphipathic helix epitope prediction algorithm			
gp120(428-433 IIIB)	gp120(422-437)	KQIINNMWQEVGKAMYA	HIV-1 infection	human(unk)	[Wasik (1997)]
		• The breadth and intensity of the CTL response and the type of Th response was studied in seven rapidly progressing HIV-1+ infants			
		• IL-2 and γ IFN production from Th 1 cells correlated with the CTLp frequency against HIV-1 Gag, Env, Nef and Pol			
		• IL-4 production from Th 2 cells was inversely correlated with the CTLp frequency			
		• The HIV-1+ children with a strong CTL responses had levels anti-CD3 MAb induction of Th 1 cells at comparable levels to uninfected children			
gp120(428-443 IIIB)	gp120(422-437)	KQIINNMWQEVGKAMYA	gp160 (IIIB) vaccinia	human(unk)	[Berzofsky (1988)]
		• Epitope T1: Proliferative response to T1 and T2 peptides in 14 immunized, uninfected humans			
gp120(428-443 IIIB)	gp120(422-437)	KQIINNMWQEVGKAMYA	polyvalent peptide	goat(unk)	[Palker (1989)]
		• Epitope T1: Goats immunized with peptides containing V3 type-specific neutralizing determinants coupled to T1			
gp120(428-443 IIIB)	gp120(422-437)	KQIINNMWQEVGKAMYA	HIV infection	human(unk)	[Clerici (1989)]
		• Epitope T1: IL-2 production detection of T-helper lymphocytes from asymptomatic HIV-positive individuals			

HIV Helper T-cell Epitopes

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
gp120(428-443 II _B)	gp120(422-437)	KQIINMWQEVGKAMYA	II _B gp160	murine(H-2 ^{k,d,t^d})	[Hale (1989)]
	• Epitope T1:	Six multideterminant helper T-cell regions are recognized by mice of three or four MHC types			
gp120(428-443 II _B)	gp120(422-437)	KQIINMWQEVGKAMYA	HIV infection	human(unk)	[Clerici (1991a)]
	• Epitope T1:	Peptides stimulate Th cell function and CTL activity in similar patient populations			
gp120(428-443 II _B)	gp120(422-437)	KQIINMWQEVGKAMYA	rgp160	human(unk)	[Clerici (1991b)]
	• Epitope T1:	Immunizing uninfected individuals with rgp160 results in stronger Th response than does natural infection			
gp120(428-443 II _B)	gp120(422-437)	KQIINMWQEVGKAMYA	HIV exposure	human(unk)	[Clerici (1992)]
	• Epitope T1:	Cell-mediated immune response to HIV-1 peptides in HIV-1 exposed seronegative men			
gp120(428-443 II _B)	gp120(422-437)	KQIINMWQEVGKAMYA	immunization	murine(unk)	[Veronese (1994)]
	• Epitope T1:	Engineered into a filamentous bacteriophage coat protein, stimulated for Ab production to the V3 loop			
gp120(428-443 II _B)	gp120(422-437)	KQIINMWQEVGKAMYA	peptide	chimpanzee(unk)	[Haynes (1993)]
	• Epitope T1:	Hybrid T1-V3 peptide immunogenicity reduced when the fusogenic domain of gp41 was added			
gp120(428-443 II _B)	gp120(422-437)	KQIINMWQEVGKAMYA	peptide	murine(H-2 ^d)	[Klimman (1995)]
	• Epitope T1:	Hybrid T1-V3 peptide activates IL-4 and IL-6 in a dose dependent manner			

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
gp120(428-451 IIIB)	gp120(422-445)	KQIMMNWQEVGKAMYA-peptide PPISGQIR	murine(H2 ^d)	[Shirai (1996)]	
		• Linked to a CTL epitope from hepatitis C virus, induced CD4+ helper cells producing IL-2			
gp120(428-443 IIIB)	gp120(422-437)	KQIMMWQEVGKAMYA	HIV exposure	human(unk)	[Pinto (1995)]
		• Epitope T1: CTL activity analyzed in parallel with T helper reactivity in exposed			
gp120(428-443 IIIB)	gp120(422-437)	KQIMMWQEVGKAMYA	HIV infection	human(DR)	[Baier (1995)]
		• Linked HIV-1 T1 and P18 peptides to anti-HLA-DR and anti-IgD Fab fragments to enhance uptake by antigen presenting cells and thus increase immunogenicity			
gp120(428-445)	gp120(424-441)	FINMWQEVGKAMYAPP-IS	HIV-1 infection	human(unk)	[Caruso (1997)]
		• T cells from HIV-1 infected individuals as they progress to disease show reduced ability to proliferate in response to HIV antigen, but retain the ability to express the activation antigens CD25 and CD71			
		• The ability to express activation markers in response to HIV is retrained, but not in response to tetanus toxoid recall antigen			
		• This study investigated CD25 and CD71 expression in PBMC from patients in various stages of progression response to <i>in vitro</i> stimulation by peptide cocktail containing four antigenic Env peptides, or else p17 and p24			
gp120(432-446 IIIB)	gp120(426-440)	NMWQEVGKAMYAPPPI	IIIB gp160	murine(H-2 ^d)	[Hale (1989)]
		• Six multideterminant helper T-cell regions are recognized by mice of three or four MHC types			
gp120(IIIB)	gp120(427-442)	MWQEVGKAMYAPPICGC	Peptide priming <i>in vitro</i>	human(unk)	[Manca (1995b)]
		• Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i>			
		• Peptide priming does not always induce T-cells that recognize whole protein			

HIV Helper T-cell Epitopes

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
gp120(437-451 IIIB)	gp120(431-445)	VGKAMYAPPISGQJR	IIIB gp160	murine(H-2 ^k ,d, ⁱ⁵ , ^{H4})	[Hale (1989)]
	• Six multideterminant helper T-cell regions are recognized by mice of three or four MHC types				
gp120(430-453)	gp120(431-454)	VGKAMYAPPISGQIRC- SSNITGLL	glycosylated gp160	murine(H-2 ^b)	[Sjolander (1996)]
	• Study showing that T cell determinants from glycoproteins can be dependent on the glycosylation of the protein				
	• Peptide stimulation of an <i>in vitro</i> proliferative response required <i>in vivo</i> priming with glycosylated protein				
	• Local glycosylation sites not thought to be part of the epitope, rather thought to be important for epitope processing				
gp120(IIIB)	gp120(437-452)	APPIGGQQISCSSNNITY	Peptide priming <i>in vitro</i>	human(unk)	[Mancea (1995b)]
	• Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i>				
	• Peptide priming does not always induce T-cells that recognize whole protein				
gp120(IIIB)	gp120(447-462)	SSNITGLLITRDGGTC	Peptide priming <i>in vitro</i>	human(unk)	[Mancea (1995b)]
	• Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i>				
	• Peptide priming does not always induce T-cells that recognize whole protein				
gp120(IIIB)	gp120(457-472)	RDGGGTNVTNNDTEVFRC	Peptide priming <i>in vitro</i>	human(unk)	[Mancea (1995b)]
	• Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i>				
	• Peptide priming does not always induce T-cells that recognize whole protein				
gp120(459-473 IIIB B10)	gp120(460-475)	GNSNNNESEIFRPGGGG	HIV infection	human(unk)	[Wahren (1989b), Wahren (1989a)]
	• 12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses				

Location	WEAU	Sequence	Immuno	Species(HLA)	References
gp120(466-481)	gp120(470-485)	FRPGGGDMRDNWRSEL	HIV infection	human(unk)	[Krowka (1990)]
	• Conjugation of HIV peptides to liposomes and rIL-2 stimulation may enhance cell-mediated responses				
gp120(474-488 IIIB B10)	gp120(476-490)	DMRDNWRSELYKYKV	HIV infection	human(unk)	[Wahren (1989b), Wahren (1989a)]
	• 12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses				
gp120(483-497 IIIB)	gp120(478-492)	RDNWRSELYKYKVVK	IIIB gp160	murine(H-2 ^{d,t4})	[Hale (1989)]
	• Six multideterminant helper T-cell regions are recognized by mice of three or four MHC types				
gp120 (482-501 IIIB)	gp120 (484-503)	ELYKYKVVKIEPLGVAV-	HIV-1 gp120 DNA	rhesus monkeys	[Lekutis (1997)]
	PTKA	PTKA	vaccine		
	• HIV-1 env DNA vaccine induced Th cell response to this epitope in a rhesus monkeys				
	• This epitope was recognized by both monkeys used in this study				
gp120(C492-506 IIIB)	gp120(486-501)	CKYKVVKIEPLGVAPT	IIIB gp160	murine(H-2 ^{d,k,t4,i5})	[Hale (1989)]
	• Six multideterminant helper T-cell regions are recognized by mice of three or four MHC types				
gp120(484-498 IIIB B10)	gp120(486-500)	YKYKVVKIEPLGVAP	HIV infection	human(unk)	[Wahren (1989b), Wahren (1989a)]
	• 12 gag and 18 env T-cell sites were identified that could commonly evoke T-cell responses				

HIV Helper T-cell Epitopes

Location	WEAU	Sequence	Immunogen	Species(HLA)	References
gp120(IIIB)	gp120(487-502)	KYKV KIEPLGIAPTC	Peptide priming <i>in vitro</i>	human(unk)	[Manca (1995b)]
	• Peptide stimulation of PBMC from non-infected individuals <i>in vitro</i>				
	• Peptide priming does not always induce T-cells that recognize whole protein				
gp120(486-494 IIIB)	gp120(488-496)	YKVV KIEPL	SHIV-HXBc2 infection	Macaca mulatta (DRB*W201)	[Lekutis & Letvin(1997)]
	• C5 region minimal epitope determined through fine epitope mapping				
gp120(494-518 IIIB)	gp120(489-514)	KVV KIEPLGVAPTKAK-RRVVQREKRC	peptide	murine(unk)	[Goodman-Snitkoff (1990)]
	• Identification of putative Th epitopes that can stimulate an antibody response in peptide immunized mice				
gp120(IIIB)	gp120(501-513)	TKAK RRVVEREKR	<i>in vitro</i> stimulation	human(DR)	[Wilson (1997)]
	• Thought to be a mimic of a HLA class II DR β chain variable region				
	• Response to this epitope may cause a breakdown of self-tolerance				
	• Presentation of epitope induced autoreactive T-cell lines in PBMC from uninfected donors				
	• Suppression of proliferation to soluble antigens by the CD8+ fraction of TKA KRRVVEREKR stimulated T cells was observed				